

Shimizu's Microgrid Research Activities

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<http://www.shimz.co.jp/english/index.html>

http://www.shimz.co.jp/corporate_information/sit/english/index.html



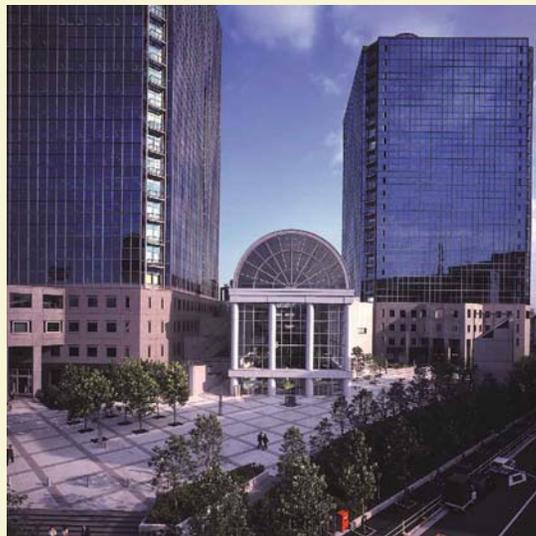
Profile of Shimizu Corporation



- Founded in 1804 in Edo (present-day Tokyo).
- Capital US \$692,478 thousand in 2005
- Employees 11,435 as of April, 2006
- Construction orders awarded US \$12,595,805 thousand in 2005
- Main businesses Project planning, designing and construction
Facility management, maintenance and renovation



Founder Kisuke Shimizu

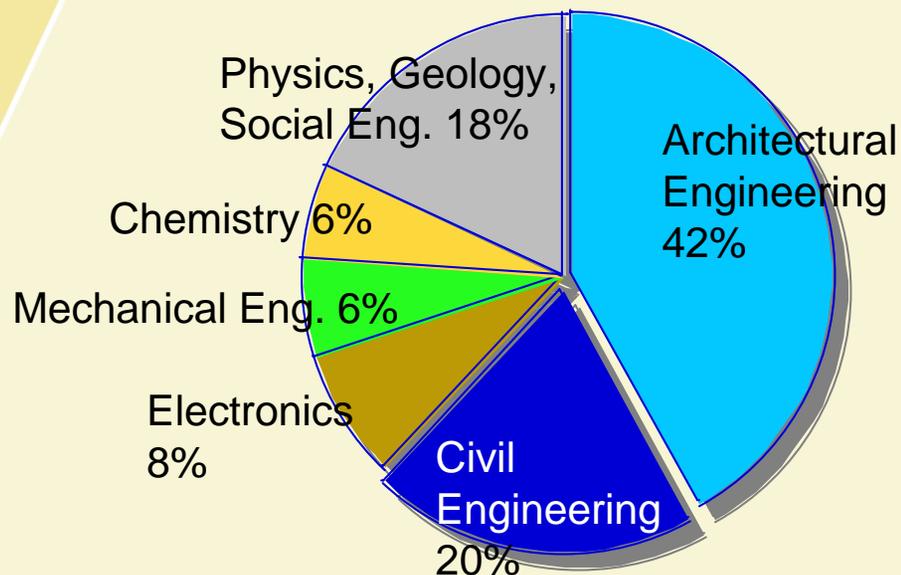


Shimizu Institute of Technology

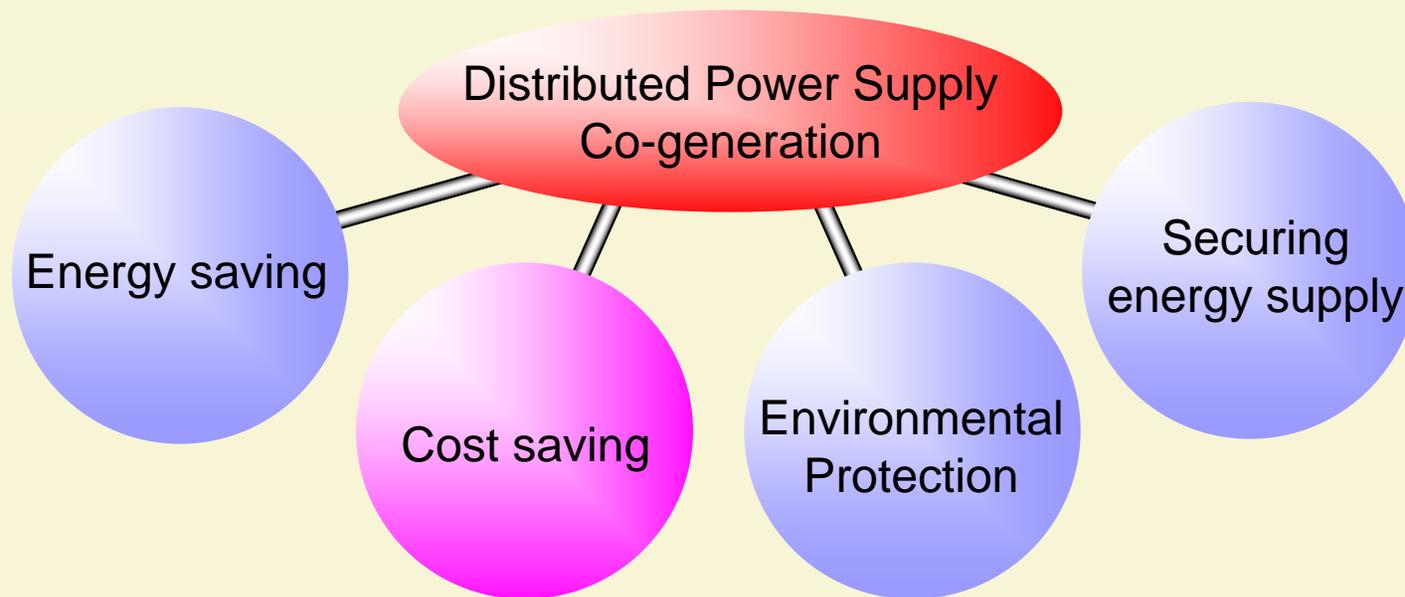


- 220 researchers and 80 staffs
- Total R&D budget in 2005 65,217 thousand US\$

Breakdown of Researchers
by Field of Education



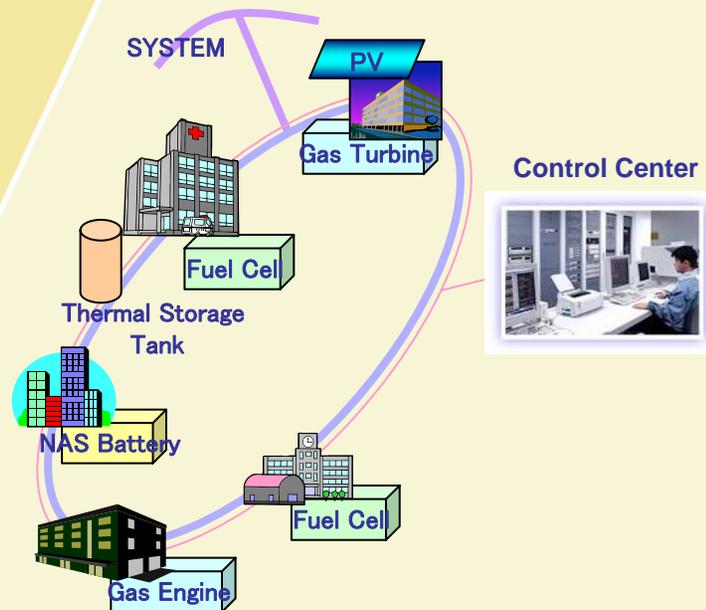
Clients' Purpose of Installing DPS



Propagation of Microgrid

Network and integrated control system of microgrid

Potential Market



- Urban development project
- University campus
- A group of factories
- Mass energy consumption facilities (hospitals, hotels, food factories...)
- High energy security facilities (hospitals, banks, data center...)



Current Activities of SIT Microgrid

- Developing microgrid control system with a small microgrid.

Gas engine generator :22kW
Gas turbine generator :27kW
Lead acid battery :20kW × 1hr
photovoltaic cells :10kW

- Load following system
- Optimum operation planning system
- Load forecasting system
- Integrated control system of heat and power



- Constructing a real size microgrid
and will start to operate in July 2006.

- Practical evaluation with a real size microgrid

Gas engine generator :90kW + 350kW
Super Capacitor :100kW × 4sec(400kJ)
NiMH battery :200kW × 2hr



Small Scale Microgrid in SIT

Existing grid

Gas Engine 22kW



Lead Acid Battery 20kWh



System Server

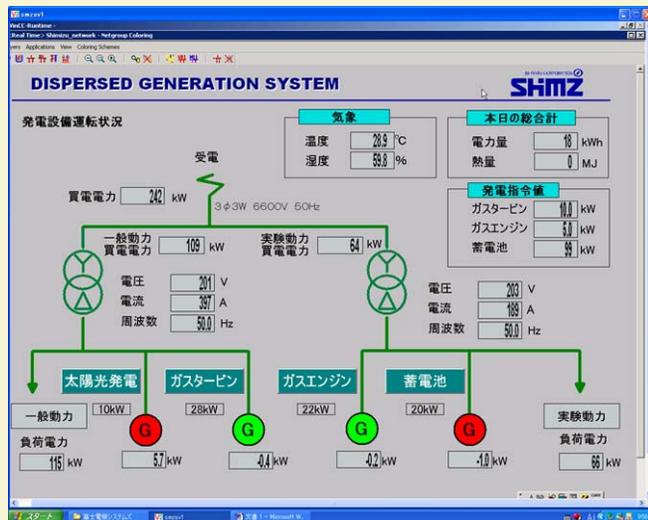


Gas Turbine 27kW

Power supply to the Main Lab Building

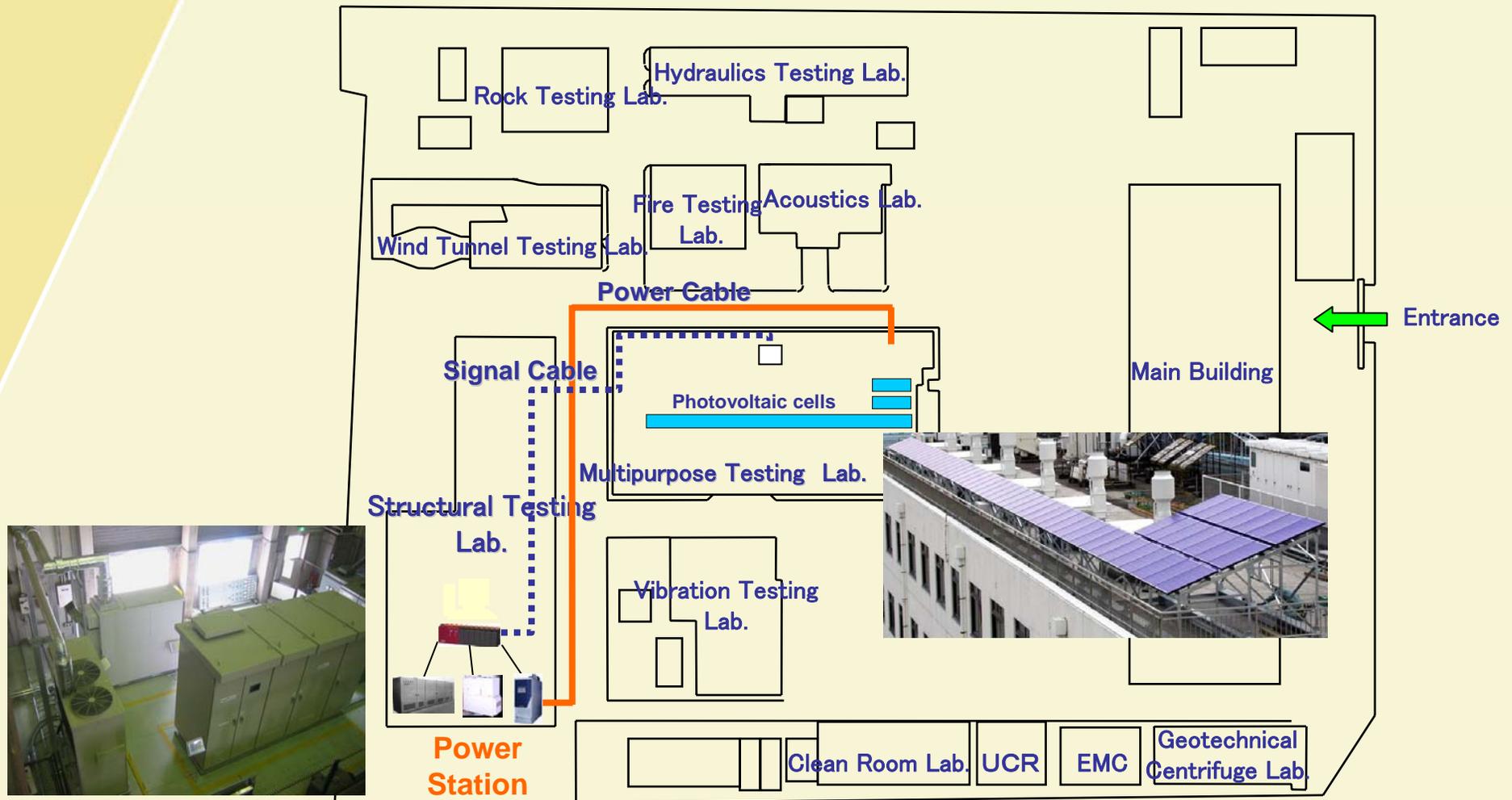


Photo Voltaic 10kW

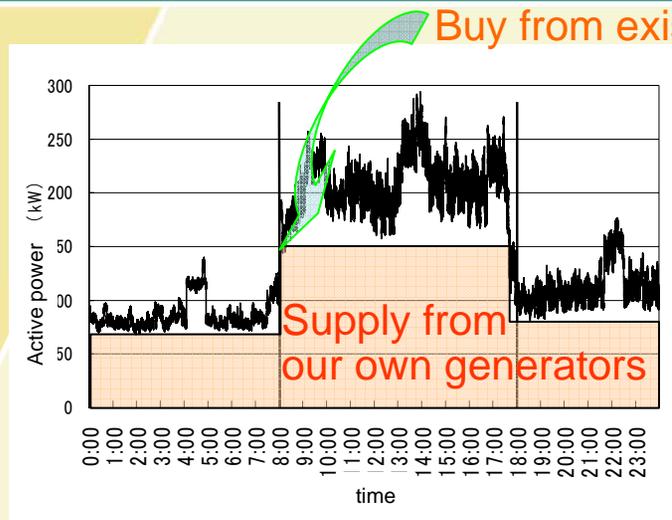


- R&D collaboration with Tokyo University of Science (Masada Lab.)
- University of Tokyo (Nitta and Baba Lab.)

Layout of Small Scale Microgrid in SIT



Basic Concept of Microgrid Control



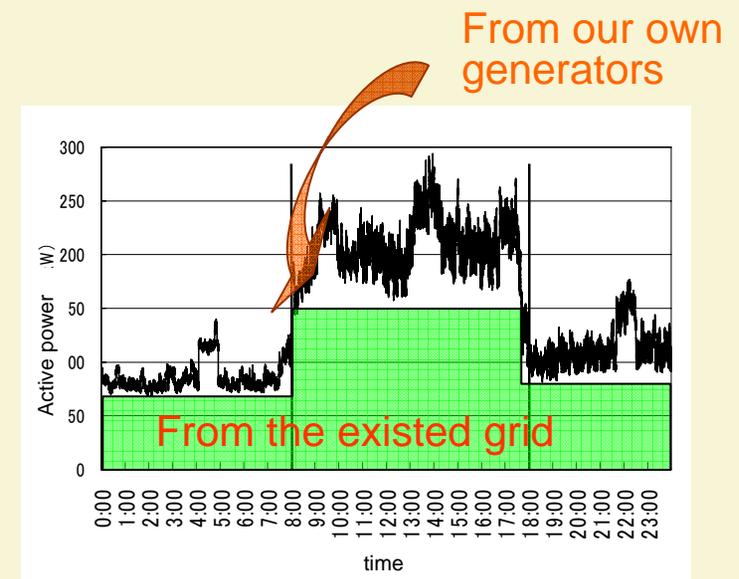
Until Today...

For the existing power company...
decrease their market share
needs to meet troublesome ancillary
services



Future...

For the existed power company...
released from ancillary services
save money for grid facilities
easy for operating planning



Best Mix for Load Following Power Control



27kW Micro Gas Turbine



Constant Power

22kW Gas Engine



Slow Response

Load Following
Power Control

Out of Control

10kW Photovoltaic Cell

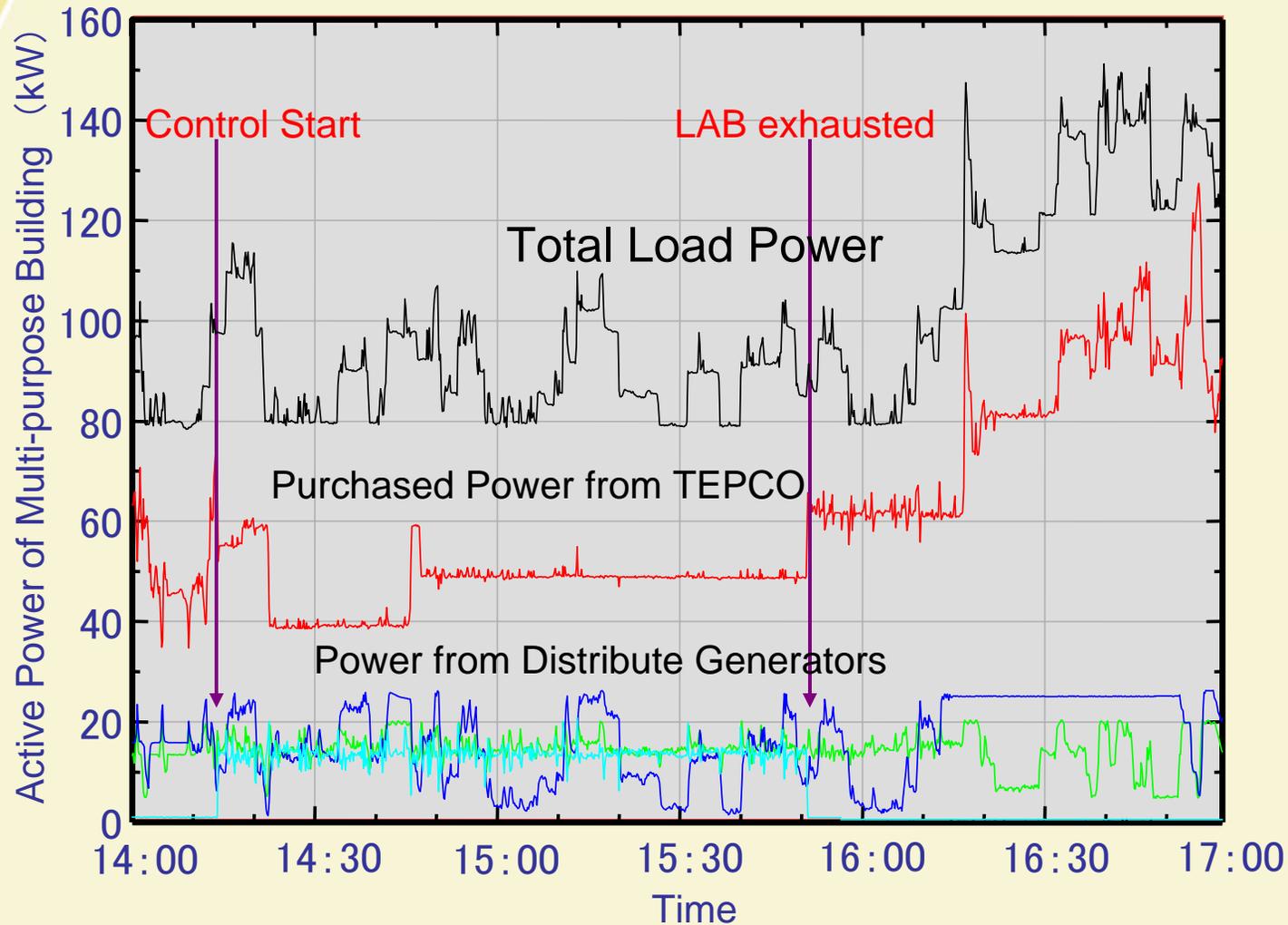


Quick response

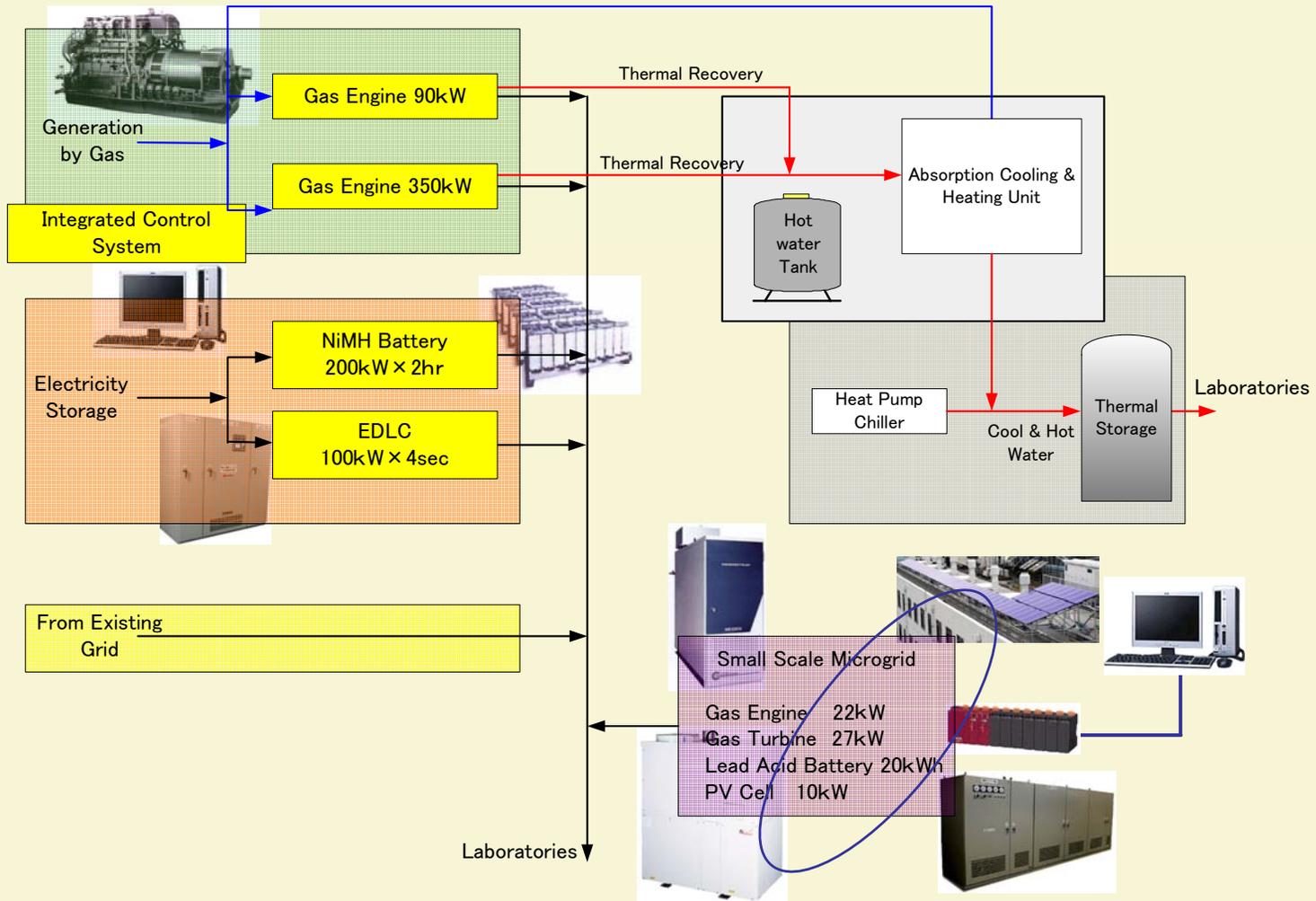
20kWh Lead Acid Battery



Control Effect in Small Scale Microgrid



Real Scale Microgrid in SIT (will be operated by July 2006)



Energy Devices of Real Scale Microgrid



Energy Plant



Gas Engine Generators

NiMH Battery 200kW × 2hr



EDLC 100kW × 4sec





Best Mix for Load Following Power Control in Real Scale Microgrid

Buy from TEPCO



Constant Power



Gas Engine
90kW+350kW

Slow Response

Load Following
Power Control



Very Quick
Response

Electric Double Layer Capacitor
100kW × 4sec



Quick Response

NiMH Battery
200kW × 2hr



Natural Resources
Canada

Ressources naturelles
Canada

Montreal 2006 – Symposium on Microgrids
June 23, 06

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Canada